

南海トラフから掘削されたハイドレート胚胎コア及び泥層コア試料の熱物性測定 Thermal constants of methane hydrate-bearing sediment and surrounding mud core samples recovered from Nankai Trough well

村岡 道弘^{1*}; 大竹 道香¹; 須々木 尚子¹; 山本 佳孝¹; 鈴木 清史²; 辻 智也³

MURAOKA, Michihiro^{1*}; OHTAKE, Michica¹; SUSUKI, Naoko¹; YAMAMOTO, Yoshitaka¹; SUZUKI, Kiyohumi²; TSUJI, Tomoya³

¹ 産業技術総合研究所メタンハイドレート研究センター, ² 石油天然ガス・金属鉱物資源機構, ³ 日本大学生産工学部

¹Methane Hydrate Research Center, National Institute of Advanced Industrial Science and Technology, ²Methane Hydrate Research and Development Division, Japan Oil, Gas and Metals National Corporation, ³College of Industrial Technology, Nihon University

This study presents measurements of the thermal constants of natural methane-hydrate-bearing sediments samples recovered from the Tokai-oki test wells (Nankai-Trough, Japan) in 2004. To investigate the influence of sediment composition on the thermal properties, the thermal constants of natural hydrate-bearing sediments were measured at 5 °C and 10MPa over a porosity range of $0.41 \leq \psi \leq 0.47$. In this porosity range, the thermal conductivity of natural hydrate-bearing sediments decreased slightly with increasing porosity. The specific heat of the hydrate-bearing sediments was almost constant and independent of porosity. The thermal diffusivity of hydrate-bearing sediment decreased with increasing porosity.

We also used simple models to calculate the thermal conductivity and thermal diffusivity. The results of the distribution model are relatively consistent with the measurement results. In addition, the measurement results are consistent with the thermal diffusivity, which is estimated by dividing the thermal conductivity obtained from the distribution model by the specific heat obtained from the arithmetic mean.

The thermal conductivity of silt soil in the mud layer sample was estimated by the distribution model, the result of which was much lower than that of the sand soil in hydrate-bearing sediment. This suggests that small grains influence the thermal conductivities.

Acknowledgments. This work was financially supported by MH21 Research Consortium for Methane Hydrate Resources in Japan on the National Methane Hydrate Exploitation Program planned by the Ministry of Economy, Trade and Industry.

キーワード: メタンハイドレート, 熱伝導率, 熱拡散率, 比熱, ガスハイドレート胚胎堆積物, ホットディスク法

Keywords: methane hydrate, thermal conductivity, thermal diffusivity, specific heat, gas hydrate-bearing sediment, hot-disk transient method